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ABSTRACT

Data on public sector superannuation plans in Ontario provide the basis for this examination of the current situation regarding the pension funds for public employees and teachers. The report describes and compares the employee/employer contributions, basic benefits, rates of return, and ratio of beneficiaries to contributors in various public retirement plans. Projections for contributor/beneficiary ratios and for the operation of the teachers' fund until 2001 are used to form simulation models. On this base, the authors construct three scenarios--most likely, pessimistic, and optimistic. All three scenarios suggest that the teachers' fund is sound, provided that the provincial government maintains interest payments on contributions. With reservations, the authors state that some improvement in teacher benefits could be provided to mitigate the effects of retrenchment. Changes in the structure of administration of the plan could result in eventual increased demand for funding and a higher degree of government involvement in setting salaries and benefits. (Author/WD)

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WORKING PAPER NO. 26

COMPARISONS AND PROJECTIONS: THE TEACHERS' SUPERANNUATION FUND IN RELATION TO PUBLIC SECTOR PENSION PLANS

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JULY, 1978

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1.0 INTRODUCTION

In Working Paper Number 7 prepared for the Commission, it was pointed out that, as a consequence of the growth in size of the school system and employment of increased number of new teachers in recent decades, a substantial number of problems both educational and financial would arise towards the end of the century. Of particular concern were the financial implications of an aging teaching force which, it was suggested, would remain largely untouched by the reduction in enrolments expected in the latter part of the century. Perhaps one of the more significant financial problems associated with the aging teaching force was the possible demands upon the superannuation system.

The Commissioner in his First Interim Report drew to the attention of the government that the amount of money required from the provincial government in 1976 to keep the fund actuarily sound would amount to almost 15 percent of total school grants (p. 356). It was also noted that in addition to this amount the government would be required to meet any deficiencies which occurred as a result of poor experience. Concerned with what could be a major financial demand on provincial resources, the Commissioner therefore requested that further examination of the superannuation problem be undertaken. This paper is a response to that concern.

This study will deal with three major issues:

(1) The general situation of the claims of public sector employees pensions on their respective funds, and on the provincial revenues, and the particular situation of the claims of teachers pensions on their fund and on the provincial revenues;

(2) Present and projected conditions of the Teachers' Superannuation Fund at selected intervals between now and the end of this century and the effects of different assumptions about the future (pertaining to numbers of active and retired teachers and to public policy) on the soundness of the fund; and

(3) The choices that this Province can make now and at various points in the future to promote both the security of teachers and the financial integrity of the provincial government.

The scope of these areas is so large and the time available for their examination is so short that no claim can be made that what follows in this paper provides an exhaustive study of the problem of the public sector pension plans in Ontario. Furthermore since the writers are forced to rely upon data derived from a variety of sources both published and unpublished, it is possible that errors and omissions may occur. Whilst it would be true to say that no efforts have been spared to provide accuracy, findings and recommendations should be treated as tentative until the opportunity has been made available to provide careful and independent checks on the accuracy of the data on Public Sector Superannuation Plans in Ontario.

2.0 DEFINITION OF PUBLIC SECTOR PENSION PLANS

The identification of occupational groups covered by superannuation programs which fall within the definition of the public sector is not as simple as it might first appear. In a simpler age it might be possible to identify as public sector employees only those who were directly employed by the provincial government. There are, however, many employees working for municipal governments and crown corporations. Whether or not such employees may be classified as being in the public sector is more of a matter of political definition than of any economic classification. For instance, university professors are employees of Boards of Trustees and Governors which have been set up by statute to provide educational service at the post-secondary level. In jurisdictions where universities are administered by province or state, university professors are civil service employees and their benefits, including superannuation are normally identical to those of other civil servants. In other jurisdictions universities are private corporations with varying degrees of government subsidy. Under both circumstances operating funds may be provided by government and therefore professors should be defined as public sector employees. On the other hand, the differences in employment conditions which they negotiate with their trustees have much more in common with the private sector.

For the purposes of this paper, public sector superannuation plans will be somewhat arbitrarily defined. They are the Public Service Superannuation Fund (PSSF), the Ontario Municipal Employees Retirement System (OMERS), Hospital of Ontario Pension Plans (HOOPP), Ontario Hydro Pension Plan (HYDRO) and the Teachers' Superannuation Fund (TSF).

The limitation of this study to only those plans indicated above should not be permitted to obscure the fact there are a substantial number of pension plans offered through universities and colleges which are funded in the same way as private sector pension plans, but which by virtue of the heavy involvement of the provincial government in the financing of such institutions may be thought of as having some claim upon the public revenues. The following table derived from various sources indicated the total number of contributors to each plan in 1975.

FUND	MALE	FEMALE	TOTAL
PSSF	47,576	27,795	75,371
OMERS	66,147	31,138	97,275
HOOPP			53,474
HYDRO	16,665	2,690	19,355
TSF	53,212	84,068	137,280
			381,755

It is clear from the above figures that of the public sector pension funds, the Teachers' Superannuation Fund is the largest. It accounts for some 35 percent of the total contributors to public sector pension plans. The inclusion of University Pension Funds would reduce this proportion, but it is clear that the Teachers' Superannuation Fund and its operation is of tremendous significance insofar as public sector pension plans are concerned. The significance of the Teachers' Superannuation Fund and its relative position with respect to provincial finance will emerge as of even greater significance when the question of the legal position of a Province with respect to funding various plans is considered.

2.1 THE LEGAL POSITION OF THE PROVINCE

2.11 Public Service Superannuation Fund

The Public Service Superannuation Act provides the enabling legislation for this fund. The Public Service Superannuation Fund is classed under the Financial Administration Act as public money and as such is included in the Consolidated Revenue Fund. Anyone aged 18 years or over and who is a permanent employee of the Province of Ontario or its designated boards, commissions and foundations is

eligible for membership in this plan.

The inclusion of the fund in the Consolidated Revenue Fund clearly indicates that the PSSF has the highest degree of provincial involvement of the five major plans under consideration. The Province guarantees the solvency of the fund. Should any deficiency in the fund exist, the deficiency must be made up out of the Consolidated Revenue Fund. The Treasurer of Ontario is designated as a custodian of the fund and also fulfills the role of trustee of the fund. The fund's assets consist entirely of deposits with the Province upon which are earned a rate of return guaranteed to be paid by the Province at the close of each fiscal year out of the Consolidated Revenue Fund. The rate of return is determined by the Lieutenant-Governor in Council. The Public Service Superannuation Board consists of four members, one of which represents the Civil Service. The function of the Board is to make recommendations to the Minister of Government Services with respect to the amounts of allowances.

2.12 Ontario Municipal Employees Retirement System

The Ontario Municipal Employees Retirement System is administered according to the Ontario Municipal Employees Retirement System Act, RSO, 1978 as amended and Ontario Regulation 68, RRO, 1970 as amended. The system covers employees of participating municipalities or local boards. Employees are covered within twelve months of the commencement of continuous full time employment. Provision may be made to enrol part-time employees. In addition to covering employees of municipal government, the Act defines designated employees to include those employed by the Province of Ontario who are not eligible to contribute to the Public Service Superannuation Fund or the Teachers' Superannuation Fund. In fact, the Province acts as a direct employer only for few members.

The provincial commitment to OMERS is less direct than for the Public Service Superannuation Fund. However, by virtue of the fact that the Province provides a large part of municipal and school board financing through transfer payments, the role of the Province cannot be neglected. The system is administered through the OMERS Board which is a corporation. The Board consists of eleven members, two of whom are officials of the Province. The Board is directly responsible to the Provincial Treasurer for the Board's policy recommendations and in addition is required to submit an annual financial report. The Province may

make recommendations prescribing composition and powers of the Board, the financial administration of the fund, pension contribution rates, provision of and defining pension benefits eligible for eligibility criteria and any other matters under the Act.

The OMERS Act and regulations stipulate that the OMERS Board may fix the rates for calculation of employer contributions and as a consequence it must be assumed that a proportion of any increase in the rates of contribution would indirectly revert to the Province from the municipalities and the school boards.

Should the fund turn negative it is conceivable that the Province could be indirectly implicated through the additional financing required to cover the increase in the rate of employer contributions. Thus, while the Province is not directly the guarantor of the fund under the statute, an indirect obligation as guarantor could exist.

Until 1975 OMERS invested its capital funds totally in non-marketable Ontario debentures. In 1975, however, the portfolio was diversified with the investment of 20 percent of new funds in marketable securities, mortgages and real estate. The investment of these funds is subject to the regulations of the Pensions Benefit Act of 1970.

In addition to covering every employee of municipalities and local boards, OMERS by virtue of agreements entered into administers the pension plans of the Ryerson Polytechnical Institutes, the Colleges of Applied Arts and Technology and the Elliott Lake Centre for Continuing Education. The board recovers the cost of administration from these plans and may deposit from time to time to the credit of the OMERS fund any excess income over disbursements accumulated by these plans. The rate of return to be credited by the OMERS fund to these plans is specified under the agreement. It should be noted that any actuarial gains or losses to the agreements will accrue to the administered plans and not to OMERS. As a consequence it would appear that there is a potential liability for ensuring the health of these plans should they run into financial difficulties.

2.13 The Hospitals of Ontario Pension Plans

The Hospitals of Ontario Pension Plan has a relationship to the provincial government similar to that of the various universities' pension plans. Legisla-

tion for their independent status exists under the terms of the Ontario Pensions Benefits Act. Thus the plan is a private plan and was introduced by the Ontario Hospital Association to be effective from January 1, 1960.

All permanent full time employees of Ontario Hospitals may join the plan on an enrolment date after the completion of six months of service. All new employees must join the plan by the first enrolment date after the completion of two years service as a condition of employment.

The Province is not directly involved in the plan as guarantor, custodian or designated employer. In spite of the lack of direct provincial government participation in the fund, it is possible that, by virtue of the large contribution made to hospital operation in the form of grants, any increase in employer contribution to the fund will result in pressure upon the government to increase operating grants. An increase in the contribution to be made by hospital employers could result from an increase in the number or value of benefits or from a negative performance on the part of the fund itself.

2.14 Pension Insurance Fund of Ontario Hydro

Ontario Hydro is a crown corporation and as such its affairs including the pension fund are subject to the administrative and supervisory powers accorded to the Province under a variety of acts of which the basic one is the Power Corporation Act, ROS 1973.

All regular employees are eligible for membership in the Ontario Hydro Pension Plan after six months service with the corporation. Employees include persons affiliated with the Office and Professional Employees International Union. Power Corporation Act defines Ontario Hydro as a custodian and employer for purposes of the Pension Insurance Fund. Thus the legal commitment of the Province of Ontario to the pension fund is indirect.

The corporation as employer is subject to regulations made under the Pension Benefits Act and is obliged to contribute towards the cost of the benefits payable in an amount equal to the difference between the amount of the contribution of the employees and the amount of the cost of the benefits as determined by actuarial evaluations. In this respect the Corporation is similar to a private employer.

While the fund is administered and maintained by the corporation, the Province

does have an indirect role as it exercises control over the corporations financial resources in their entirety. The corporation files an annual report for each fiscal year with the Minister of Energy. In more recent years this report has included the Pension and Insurance Fund as a separate item for consideration. Furthermore, the accounts of the corporation may be audited upon direction of the Lieutenant-Governor in Council at any time and at least once a year by an auditor specifically appointed by the Lieutenant-Governor.

Since the corporation does not operate within the grants sector, it is likely that any problems associated with operation of the pension fund will be incorporated into the overall cost structure of the corporation and result in higher rates to the consumer of power. There is, however, a possibility that the Province could become involved in the financing of deficits of Ontario Hydro Pension Fund by virtue of the fact that the corporation is granted general borrowing powers subject to approval of the Lieutenant-Governor in Council. The Province furthermore guarantees Ontario Hydro bonds and the Lieutenant-Governor in Council may guarantee the repayment of advances made by banks or any other indebtedness incurred by the corporation. There is an implication therefore that should the Hydro Pension Fund turn negative and the corporation be unable to provide for the required amounts through adjustment of the operating costs, the Province may guarantee any of the borrowings of the corporation necessary to correct the situation. In this way the Province becomes indirectly the guarantor of the Hydro Pension Fund.

2.15 Teachers' Superannuation Fund

The operation of the Teachers' Superannuation Fund is governed by the Teachers' Superannuation Act, ROS 1975, Chapter 455 and subsequently amended, and Regulation 810, RRO 1970 as amended. Eligibility for the plan is confined to employees of school boards, Province of Ontario or other designated educational institutions. Because of the rather wide array of designated institutions, there are substantial numbers of employees in both private and public institutions who may be covered by the Teachers' Superannuation Act. Thus teachers in private schools are eligible for membership in the fund as may be the university professors who at one time or another were contributors to the Superannuation Fund. Whilst the number of such members may not be a large proportion of the total membership of

the fund, this situation may give rise to incongruities which have institutional repercussions. For instance, university pension plans in general, provide for later retirement ages than do the Teachers' Superannuation Fund. Furthermore, because of the provisions of the Superannuation Benefits Adjustments Act, professors covered by the Teachers' Superannuation Fund face the prospect of retirement at an earlier age and with more advantageous provisions than do their colleagues who are covered by the university pension plans. The degree of provincial involvement in the Teachers' Superannuation Fund plan is high.

Although the legal employers of the bulk of membership in the Teachers' Superannuation Fund are School Boards, the employers' contribution to the Superannuation Fund is not made by school boards, but by the provincial government. Furthermore, under the Pensions Benefit Act, the Province makes special payments to service the initial unfunded liability which existed when the Province took over the fund in 1969 and makes payments to amortize additional liabilities which have arisen since that date. Insofar as contributions to the pension plan are concerned, therefore the Province becomes in effect the employer. Further comment must be made with respect to this anomalous situation in the conclusion of this section of the report.

In addition to its role as an employer for superannuation purposes, the Province acts as a guarantor of the fund, as custodian of the fund and as a guarantor of issued debt. As guarantor to the fund the Province is required to make up deficiencies when payments into the fund in any year are insufficient to make the required payments out of the fund. The Province also acts as guarantor to issued debt by providing the investments of the fund over 90 percent of which are non-marketable Ontario bonds. The remainder of the funds are invested in short-term notes and deposits. The Treasurer of Ontario is the custodian of the fund and may at the request of the Minister of Education arrange for any chartered bank of Canada to provide a cash advance to the fund in an amount required temporarily to provide for payment out of the fund and may furnish securities of the Superannuation Commission as collateral.

Whilst the Teachers' Superannuation Commission is specifically charged with the administration of the affairs under the Act, the Lieutenant-Governor in Council may make regulations prescribing eligibility for benefits and governing leaves of absence, re-employment, transfers, refunds, minimum pensions subsidies,

recovery of past service and any other matters under the Act.

Those eligible for membership in the Teachers' Superannuation Fund are also eligible for benefits provided by the Teachers' Superannuation Adjustment Fund. As noted in Working Paper Number 7, this fund is administered separately by the Provincial Treasurer. It is different in three major respects from the Superannuation Fund itself.

1) There is no requirement for actuarial costing or evaluation.
2) There is no provision for unfunded liability.
3) The rate of interest is determined by Order-in-Council.

The degree of provincial involvement in funding the Teachers' Superannuation Adjustment Fund, therefore, is legally much more direct and therefore of even greater significance than it is in the administration of the Teachers' Superannuation Fund itself.

2.16 Discussion

From the foregoing discussion of the five largest public sector pension plans currently operating in the Province, it becomes apparent that the position of the Teachers' Superannuation Fund is anomalous. For most practical purposes, the operation of the Teachers' Superannuation Fund is closely akin to that of the Public Service Superannuation Fund. On the other hand, the conditions under which most teachers are employed are more closely related to that of employees covered by OMERS or HOOPP. There is an indirect involvement of the Province in the operation of both OMERS and HOOPP as a consequence of the employers dependence upon government grants for a major proportion of revenue. There is however a much more direct responsibility of the Province in the case of the Teachers' Superannuation Fund, despite the conditions under which the revenue of the employer is derived being almost identical to those of municipal governments and hospitals.

It may be argued that the anomaly may have a number of financial implications for the Province. First, although the Province is required to match the 7 percent contribution of the employee's salary (6 percent to the fund, 1 percent in respect of the Superannuation Benefits Adjustment Act), the Province takes no direct part in establishing the level of salary upon which the contribution is based. School boards in Ontario have become accustomed to negotiate salaries without necessary consideration of the real cost of superannuation benefits.

Secondly, because school boards are not faced with the problem of meeting pension funds deficiencies out of operating expenditure, there is a potential attraction for school boards in supporting through the teacher-board negotiation process, and by representation to the provincial government, mechanisms which will encourage early retirement of teachers. Clearly this arrangement permits school boards to evade full responsibility for financial decision-making.

This problem has an impact on general provincial finance. Since the Province is required to contribute to the fund 7 percent of whatever levels of salaries are decided upon by local school boards, prediction of the annual amount required to be set aside from provincial revenues for this purpose becomes almost impossible. As a consequence it is to be expected that the unfunded liability of the fund will increase if for no other reason than the existence of a time lag between the settlement of teachers' salaries and the allocation of government revenues.

From this brief examination of the scope of public sector pension plans in Ontario and the degree of government involvement in them. It becomes clear that most of the problems that occur in the public sector pension plans are likely to occur at the teachers' Superannuation Fund. It is true that the degree of government involvement in the Public Service Superannuation Fund is very high. But it must be pointed out that the number of employees involved is just over half the number covered by the Teachers' Superannuation Plan. Government involvement in OMERS, HOOPP and HYDRO Pension Plan is indirect and financial responsibilty limited. The Extent to which the provincial government may be financially committed will depend on the performance of the various funds. A brief examination of these funds follows in the next section.

3.0 DESCRIPTION AND COMPARISON OF PUBLIC SECTOR PLANS

3.1 Introduction

This section provides a brief description and discussion of the more significant aspects of the Public Sector Pension Plans under consideration. The aspects include:

1) Employee Contributions
2) Employer Contributions
3) Basic Benefits

4) Rates of Return on Investment

5) Ratios of Beneficiaries to Contributors

In the presentation of the description and discussion an attempt has been made to provide details of the actuarial assumptions and approaches to evaluation which differ from plan to plan.

The primary purpose of the presentation is to shed some light on similarities and differences of the various plans as they may be compared to the Teachers' Superannuation Plan.

3.2 EMPLOYEE CONTRIBUTIONS

3.21 PSF

Six percent of salary up to basic CPP exemption; 4.2 percent of salary between basic CPP exemption and CPP yearly maximum pensionable earnings (YMPE); and 6 percent of salary above YMPE.

3.22 Teachers' Superannuation Fund

The same as above.

3.23 OMERS

For normal retirement age at 65 the employee contribution is 5½ percent of annual salary up to YMPE and 7 percent of salary above YMPE. For normal retirement age at 60 years (optimal entitlement available only to groups of policemen and firemen) the employee contribution is 6½ percent of annual salary up to YMPE and 8 percent of salary above YMPE. The rates of employee contribution up to December 31st, 1977 were 1½ percentage points less in each case.

3.24 HOOPP

The employee contributions are 4.5 percent of earnings up to CPP's YMPE and 6 percent of earnings above YMPE.

3.25 HYDRO

The member contributes 3.43 percent of whichever is less - earnings during the calendar year or a portion of his earnings equivalent to YMPE for the year.

3.3 EMPLOYER CONTRIBUTIONS

The employer contributions under the public sector plans fall into two groups. The first group comprises the PSSF and the TSF in which the employer contribution is mandated by the government as matching that of the employee. The second group comprises the OMERS, HOOPP and HYDRO. For these three funds the employer's contribution is determined by actuarial evaluation. The difference in approach to the determination of the employer contribution is partially explained by the legislative framework within which the funds exist. Regulation under the Pension Benefits Act require that privately administered plans such as HOOPP, OMERS and HYDRO must reduce all unfunded liabilities over specified periods. The government administered plans, PSSF and TSF, are not required to reduce their initial unfunded liability. However, unfunded liabilities which arise from plan amendments or experience deficiencies must be amortized. One consequence of this difference in structure is that the privately administered plans tend to have a higher degree of provisional funding than do the government plans. Table 3.3 gives some indication of the degree of provisional funding of each plan at its most recent actuarial evaluation. It should be cautioned that Table 3.3 does not provide the basis of a direct comparison between the plans inasmuch as there are differences in evaluation periods and methods and differences in the actuarial assumptions.

3.4 BASIC BENEFITS

3.41 PSSF

For employees beginning after January 1st, 1966 basic benefit is computed by multiplying 2 percent of the highest consecutive five year average salary by the years of service to a maximum of 35 years. For employees beginning before January 1st, 1966, basic benefit is computed by taking the highest of 2 percent of the highest three year average salary times service years up to a maximum of 35 years or 2 percent of the highest five year average salary times the service years up to a maximum of 35. Employees may retire at 65 with 10 years service, at 60 with 20 years service or when age and service equal 90.

3.42 TSF

For retirement after November 30th, 1971, the full pension is paid when the

TABLE 3.3

CAPITAL FUND AS A PERCENTAGE OF

ACTUARIAL LIABILITIES[1]

FUND	DATE OF VALUATION	PERCENTAGE
PSSF[2]	Dec. 31, 1973	72.1%
TSF[3]	Dec. 31, 1975	53.0%
OMERS[4]	Dec. 31, 1974	114.1%
HOOPP[5]	Dec. 31, 1973	86.7%
HYDRO	Dec. 31, 1973	89.8%

[1]Actuarial liabilities are calculated on an accrued benefit method.

[2]Incluces salary projection and accrued service to date.

[3]Actuarial liabilities on accrual method are estimated 1975 figures and subject to change. As at 1972, the percentage was 61.8.

[4]On an accrual basis OMERS reports an actuarial surplus.

[5]Salary projection but accrued service to date.

sum of age plus service equals 90 years. The benefit formula is the number of years service (maximum 35) divided by 50 times the highest 7 years average salary.

3.43 OMERS

The basic formula for full time employees is 2 percent of the annual average of the highest 6 consecutive months of earnings, multiplied by the years of continuous service since enrolment in OMERS to a maximum of 35 years. The amount is reduced when a member is eligible for the Canadian Pension Plan.

3.44 HOOPP

The basic benefit formula is composed of 3 segments relating to service before 1960, service between 1960 and 1966, and service since 1966. The formula is:

a) Pre-1960 Service:

i) one percent of the 1959 salary times the number of years of continuous service up to Dec. 31st, 1959 less 2 years, if retirement is before Jan. 1st, 1968; or,

ii) 1.5 percent of the 1959 salary times the number of years of continuous service up to Dec. 31st, 1959 less 2 years, if retirement is after Jan. 1st, 1968; plus,

b) Service Between 1960-66:

i) two percent of highest consecutive 5 year salary times the number of continuous years of service between Jan. 1st, 1960 and Jan. 1st, 1966; plus

c) Service since 1966:

i) two percent of highest consecutive 5 year salary; less 0.6 percent of the last 3 years average YMPE before retirement, times the number of continuous years service since Jan. 1st, 1966.

3.45 HYDRO

Pensions are calculated as the sum of

a) two percent of the member's highest 5 year average multiplied by the number of years, and

b) two percent of his premium service from 1948 to 1957.

3.46 Discussion

Generally speaking public sector pension plans provide for an annual pension close to 70 percent of the members' final earnings. The percentage depends on whether one uses a 5 or 7 year average for the computation of benefits.

The T.S.F. and the P.S.S.F. provide full benefits at an earlier age than do the rest of the public sector funds. For example, a teacher entering the profession at age 20 (possible in the case of elementary teachers prior to 1973) could retire at age 55. Teachers entering the profession with a degree and one year of teacher education can conceivably retire at age 57 or 58. The only other plan in the public sector which provides for general retirement at age earlier than 65 is OMERS which has special provisions for firemen and policemen. A comparison of the employee contribution rates indicates, however, the rate of contribution under OMERS for policemen and firemen, for whom normal retirement age is 60, to be one half percentage point higher (up to YMPE) and 2 percentage points greater thereafter.

On the other hand, the rate of employee contribution to both PSSF and TSF is quite comparable to those funds where normal retirement age is 65 (OMERS and HOOPP). Employee contributions for those covered by the HYDRO Pension Plan are lower than those required by members of any of the other funds. Both the PSSF and the HOOPP, each with employee contributions of 6 percent, provide for retirement at ages earlier than 65, though at a reduced rate of benefit.

From this discussion of benefits and contributions it would appear clear that although the level of benefit for participants of the Teachers' Superannuation Fund and the Public Service Superannuation Fund is comparable to those of public sector plans in general, the benefits are available at an earlier age than those in which the contributions are the same. They are also available at lower rates of contributions than those paid to other plans (primarily policemen and firemen) in which retirement at age less than 65 is possible.

Overall it is difficult to escape the conclusion that teachers and civil servants have already a more favourable retirement plan than do other employees in the public sector. Any improvement in the retirement system can hardly be justified in terms of equity. Emphasis of the equity principle might in fact dictate less favourable conditions. Maintenance or improvement of the present

system can only be justified on financial grounds. However, the most recent actuarial valuation of the Teachers' Superannuation Fund recommended an increase in both employer and employee contributions. On this basis alone it is highly unlikely that such justification could be found.

3.5 RATES OF RETURN

It is recognized that one of the major sources of government borrowing is contributions to public sector plans. In Ontario, the PSSF, the TSF and OMERS are required to invest all or, in the case of OMERS the greater part of their funds in non-marketable government securities. There are some who would argue that this requirement hampers unnecessarily the growth of these pension funds. Table 3.5 provides data on the relative investment performance of the funds over the period 1965-1975.

TABLE 3.5

WEIGHTED AVERAGE RATE OF RETURN ON
AVERAGE CAPITAL FUND 1965-1975 (Percent)

	PSSF[1]	TSF[2]	OMERS[3]	HOOPP[4]	HYDRO[5]
Rate of Return	5.5	5.9	7.9*	4.9	5.8

*Adjusted to reflect retroactive interest payment by Province

Sources: Calculated from Annual

1. Public Service Superannuation Act: Ontario Public Accounts Schedule of Reinvestment of PSSF, Schedule of Interest Rate Credited to PSSF.
2. Teachers' Superannuation Fund Annual Reports.
3. Annual Reports of OMERS.
4. Report of Pension Committee, Ontario Hospitals Association.
5. Report of Pension Fund, Ontario Hydro.

It is clear from this Table that the plans which invest in non-marketable Ontario bonds offer investment yields which are quite comparable to the diversi-

fied portfolio yields of HOOPP and the HYDRO Plan.

3.6 RATIO OF BENEFICIARIES TO CONTRIBUTORS

The number of beneficiaries as a percentage of the number of contributors for each plan as of 1975 is as follows:

PSSF	18.2%
TSF	12.5%
OMERS	10.1%
HOOPP	15.8%
HYDRO	19.1%

The relatively low ratio between beneficiaries and contributors in OMERS and the TSF is a natural consequence of the rapid expansion of municipal services in the 1960's and early 1970's. It may be expected that the ratio of contributors to participants will decrease in all public sector pension plans in accordance with the general aging of the population towards the end of the century. It is equally certain that the ratio for OMERS and TSF will accelerate much more sharply towards the end of the century as the bulk of employees who began their service in the 1960's and 1970's reach retirement. The significance of these ratios and their projected rates of change is of considerable importance in determining the degree of subsidy direct or indirect which will be required from the provincial government.

3.7 OTHER RELATIONSHIPS

A general examination of the future of public sector plans in Ontario would be incomplete without some indication of general relationships which exist among some of the basic financial data related to the current operation of the various pension plans.

Appendix A provides details of the variables which account for the performance of the various plans in terms of their operation in the period 1965-1975. Table 3.7 has been compiled from the data contained in this appendix.

The table shows that in spite of the relatively low ratio between the number of beneficiaries and contributors to the Teachers' Superannuation Fund (Section 3.6) the total of benefit payments and refunds as a percentage of total

TABLE 3.7

SELECTED RELATIONSHIPS FOR PUBLIC SECTOR PENSION FUNDS
ONTARIO, 1975

Relationship	Funds				
	PSSF	OMERS	HOOPP	HYDRO	TSF
Benefit Payments as % of Total Contribution	35.5	7.0	8.9	23.7	62.8
Benefit Payments and Refunds as a % of Total Contribution	47.2	12.2	19.3	25.3	70.3
Benefit Payments and Refunds as a % of Gross Inflows	27.1	8.0	16.0	16.1	28.5

Sources: Tables I-IV, Appendix A

contributions is substantially higher than those for the other funds. The ratio between beneficiaries and contributors was also relatively low in the case of OMERS. In terms of current funding however, benefit payments and refunds as a percentage of gross inflows are less than a third of the proportion required to make payments and refunds for the Teachers' Superannuation Fund. The data suggest that even if there were a sharp increase in the number of beneficiaries under the OMERS plan, the level of contributions would be adequate to meet these payments. A similar change in the proportion of beneficiaries under the Teachers' Superannuation Plan would suggest that benefit payments and refunds would exceed total contributions. There is more of a leeway when the position of gross inflows which include interest and amortization payments is concerned, but even so outflows from the fund constitute a higher proportion of inflows than for the other funds. Furthermore, the potentially earlier retirement age of those covered under the Teachers' Superannuation Fund suggests that beneficiaries will remain in the system for a longer average time than beneficiaries under the other systems, thus it is likely that the picture will worsen over time.

The data with respect to the ratio of beneficiaries to contributors provided in Section 3.6, and the data provided in Table 3.7 would suggest that of all the public sector pension plans, the Teachers' Superannuation Fund is the most likely to require government payments to meet experience deficiencies. The likelihood of requirements for such deficiency payments would be substantially increased if there were to be any increase in the benefits provided under the Teachers' Superannuation Fund to meet declining enrolments.

The likelihood of a need to make experience deficiency payments is increased when one adds to the above considerations the effect of the Superannuation and Benefits Adjustment Act. Whereas the future financial position of OMERS, HOOPP and HYDRO is not automatically affected to any great extent by continued inflationary pressure, both the PSSF and the TSF are affected directly by such pressure. Since the provincial government has little direct control over the rate of inflation and since it is impossible to forecast with any degree of accuracy the demands upon this fund, the extent to which this fund will require increasing contributions from consolidated revenue can not be predicted.

4.0 THE TEACHERS' SUPERANNUATION FUND - ALTERNATIVE FUTURES

4.1 INTRODUCTION

At first glance one would suspect that the position of the Teachers' Superannuation Fund compared to other public sector pension plans would give rise for concern. In 1975 benefit and refund payments of TSF, as a percentage of total contribution, were the highest of the public funds. It might be hyposthesized, therefore, with a declining teaching force and an increasing number of beneficiaries that the soundness of the fund was questionable.

Such an hypothesis would neglect the fact that there was a tremendous increase in the size of the teaching force in the 1960's and that the increased number of teachers would remain in the force until retirement with their superannuation contributions gaining interest until late in the centur- when they become eligible for retirement.

To provide further information on the problems, two sets of projections have been made.

1) A set of projections for the ratios between contributors and beneficiaries to the fund until 2001.

2) A set of projections of the operation of the fund itself until 2001.

The projections have been made through the vehicle of simulation or conditional forecasts. The problems inherent in this approach generally are discussed in Working Paper Number 1 Resources and Constraints, Public Education and the Economic Environment in Ontario 1978-1987 (Foot, 1978). In particular the difficulties attending long-term analysis are worthy of note (p. 5). Since the projections provided in this section are essentially of the long-term variety, the cautions expressed are even more important.

Because of the difficulties of long-term forecasting, three different projections are provided for each of the two dimensions of the analysis. Each projection is based on a different scenario or set of assumptions about the future. The three scenarios are:

4.11 A Most Likely Scenario

Projections based on the most likely scenario use assumptions which are considered the most realistic in the light of present knowledge.

4.12 A Pessimistic Scenario

Projections based on the pessimistic scenario use assumptions which, within the limits of reasonableness, are likely to have the most negative effect on the behaviour of the fund.

4.13 An Optimistic Scenario

Projections based on the optimistic scenario use assumptions which, within the limits of reasonableness, are likely to have the most positive effects on the behaviour of the fund.

In view of the high degree of uncertainty which attends long range projections, a discussion of the assumptions upon which the data has been based is provided in the following section.

4.2 THE VARIABLES

There are three major sets of variables in a simulation.

1) Exogenous variables which for the purposes of these simulations

are projections and assumptions about future behavioural, economic and demographic variables.

2) Endogenous variables which for future years are generated by the model itself as they are influenced by
   a) the exogenous variables, and
   b) the data reflecting the position of the fund's operation in the initial year of the simulation.
3) The technical design of the simulation of the structural relationships between the variables outlined above.[1]

Since the data reflecting the position of the fund in the initial year of operation must be accepted as given, variations in the projections will be the result of changes in the exogenous variables a discussion of which follows below.

For the purposes of the projections five exogenous variables have been identified.

1. Future Teacher Demand
2. Hiring
3. Retirement Rates
4. Rate of Salary Increase
5. Interest Rates

4.21 Future Teacher Demand

Future teacher demand is critically important in the simulation. Teacher demand is the sum of the number of new teachers who enter the profession, and the annual stock in the profession. It constitutes the base from which current contributions to the superannuation fund in any year will be derived and the base from which the pool of future beneficiaries will be drawn. Unfortunately, the derivation of data for future teacher demand is made extremely difficult because of two major factors. The projected enrolment in the elementary and secondary school system is clearly a major determinant of the total demand for teachers and is primarily based on demographic factors. The demand for

[1] Details of the technical design of the simulation are available from Prof. J. Chalcraft, Department of Economics, Brock University.

teachers is also influenced significantly by policy decisions relating to the size and scope of programs to be offered in the schools and by pupil-teacher ratios.

The development of the teacher demand data was accomplished in two stages. A variety of enrolment projections based on varying assumptions about migration patterns and fertility rates were provided by the Commissioner. From these projections optimistic, pessimistic and most likely enrolments were selected. The most likely estimate was based on a 1.6 fertility rate and a 25,000 net migration rate. The pessimistic assumption was based on the same net migration rate and a 1.5 fertility rate. The optimistic projection was based on a 1.7 fertility rate and a 25,000 net migration rate. Details of these enrolment projections are provided in Appendix 3.

The next stage in developing teacher demand data was the establishment of pupil-teacher ratios. It was assumed for the purposes of all simulations that the pupil-teacher ratio would remain at the 1976 level. This level is 17.5 in the secondary school and 23.6 at the elementary level (Interim Report, Appendix B, p. 42 and 50).

Because of the importance of pupil-teacher ratio in determining overall demand for teachers, it was decided to experiment with variations on the pupil-teacher ratio. Although there was little data which would support an increase or decrease in the ratio, experimentation indicated that a variation of plus or minus one at both elementary and secondary levels would have the effect of changing estimates of total teacher demand by approximately 5 percent plus or minus for each year. Rather than provide additional simulations reflecting the different assumptions with respect to pupil-teacher ratio, it was decided to indicate that the differences in assumptions about pupil-teacher ratio would have the effect of creating a variation of up to 5 percent in either direction in both estimates of contributor beneficiary ratios and cash flows. The three estimates of teacher demand arrived at through the above data are provided in Table 4.

Total teacher demand as provided in the table (4) is made in terms of full-time equivalents. The simulations, therefore, are also made in terms of full-time equivalents.

In spite of the critical nature of this data for the purposes of the

TABLE 4

Estimates of Teacher Demand

	Low	Medium	High
1976	92738	92738	92738
77	91668	91668	91668
78	89988	90019	90050
79	88514	88523	88532
80	86751	86824	86897
81	85149	85282	85414
82	83364	83509	83654
83	81429	81626	81773
84	80300	80446	80591
85	79538	79683	79827
86	79185	79359	79532
87	79104	79285	79465
88	79059	79221	79383
89	78804	78871	78937
1990	78407	78457	78497
91	78297	78406	78515
92	78356	78536	78741
93	78545	78812	79191
94	78622	79001	79643
95	78755	79047	80281
96	78656	79440	80854
97	78411	79494	81324
98	78061	79456	81673
99	77688	79289	81845
2000	77300	79157	81843
01	76912	78875	81672

Sources: 1) Enrolments Projection provided by C.O.D.E.

2) P.T.R. Assumption of 23.6 Elementary
17.5 Secondary

simulation it must be pointed out that the wide variations in projected enrolment data of up to 34 percent over the 25 year span together with the somewhat dubious assumption about the stability of the pupil-teacher ratio should encourage caution in the interpretation of the results of the simulations. In addition to these problems there was a third difficulty relating to the distribution of teachers hired.

The distribution of teachers hired may be considered from two standpoints. The first is that of the distribution between new teachers and reinstated teachers. The second standpoint is the sex distribution between male and female teachers. The distribution between new and reinstated teachers is of importance in that it will effect the lengths of time during which each teacher will make contributions to the fund. The sex distribution is important for two reasons:

1) current data suggests that female teachers have a higher rate of withdrawal from the profession than do males, particularly in the earlier age group, and
2) the mortality tables indicate that females have a tendency to greater longevity than do males after retirement.

The significance of the distributional question from the point of view of the simulation may be, however, lessened by the following factors:

1) Given the expected lack of mobility in the teaching force and its overall size, it may be anticipated that the number of new teachers entering the profession will constitute a relatively small proportion of the overall teaching force.
2) Since salary grids by which teachers are paid do not discriminate on the basis of sex, the significance of a distribution by sex for cash flows diminishes.

After weighing all these considerations above, it was decided that the simulations would not be affected significantly by incorrect assumptions concerning the distribution of the teaching force. It was therefore assumed that throughout the period covered by the simulation, the distribution between new graduates and reinstatements would remain stable and reflect the pattern of 1976 when new teachers accounted for 80 percent of all hiring and reinstatements for 20 percent (Ministry of Education, 1976, p. 72). The distribution

by sex was assumed to be the same as the current distribution at the elementary school level which is 67 percent female and 33 percent male (Atherton, p. 2).

The above percentages were combined to provide a single ratio for the reinstatement, new-hiring and sex dimension. This ratio was held constant for the most likely and pessimistic scenarios but changed for the optimistic scenario. For the optimistic scenario the ratio was assumed to reflect a higher percentage of females as contained in the current male-female mix in the elementary rather than the combined elementary-secondary system.

The application of these ratios to the teacher demand data generated an indigenous variable which is not accounted for in the later discussion of assumptions upon which alternative scenarios were selected.

4.22 Retirement Rates

Retirement rates are clearly of great significance since they are responsible for generating the number of beneficiaries and the number of new hirings.

In the absence of any evidence which would indicate otherwise, it was decided to use the probabilities of retirements provided in the actuarial report of the 1975 evaluation for basic data. These probabilities are as follows:

ASSUMED PROBABILITIES OF RETIREMENT AMONG TEACHERS
ELIGIBLE FOR 'A' PENSION*

Age at Retirement	1975 Valuation	
	Males	Females
55	.15	.20
56	.15	20
57	.15	.20
58	.17	.20
59	.19	.20
60	.25	.25
61	.25	.25
62	.25	.25
63	.25	.25
64	.40	.40
65	1.00	1.00

*'A' Pension in full is payable at age 65 or when age and years of service total 90.

Source: Actuarial Report, Teachers' Superannuation Fund, June, 1977.

The critical comments with respect to these assumed rates of retirement probability provided in the working paper (Atherton, p. 40) remain relevant. As a consequence it was decided to allow for the trend towards encouraging early retirement. The pessimistic simulation, therefore, provides for an increase in the probabilities of retirements for males aged between 55 and 59 by 5 percentage points. This increase will bring the probabilities of male and female retirement at specific ages to the same point.

4.23 Salaries

Projections of the rate of salary increase are important for the purpose

of simulating cash flows. The significance of salary projections is emphasized in the 1975 actuarial report where it was noted that the dramatic increase in unfunded liability between 1972 and 1975 was due primarily to erroneous assumptions made concerning the rate of salary increase and rates of interest. Clearly where such erroneous discrepancies can be shown to occur over a three year period, the possibility for far wider discrepancies arises when the period of projection is increased to 25 years.

The rate of salary increase assumed for the most likely scenario has been assumed to be that provided by the Ontario Economic Council which suggests that government sector wage increases between 1976 and 1987 will be in the following range.

1976	11.0
1977	9.1
1978	8.2
1979	7.0
1980	6.4
1981	6.0
1982	6.2
1983	7.1
1984	7.1
1985	7.3
1986	7.4
1987	6.9

Source: Foot et al., The Ontario Economy 1978-1987, Toronto, Ontario Economic Council, 1977, p. 56-57.

Lacking any further data it was assumed that for the period following 1987, the increase in salary would be constant at 6.9 percent.

It is extremely difficult to assess the reliability of these estimates but it must be pointed out first that these rates are the only ones which have been projected for the Ontario scene and that they are based on a sophisticated model.

For simulation purposes the rates of salary increase projected by the Ontario Economic Council have been varied by 2 percentage points per annum, i.e., for the most optimistic simulation salary increase has been provided for at 2 percent per year below the above rates and for the most pessimistic

scenario salary increase has been projected at 2 percent per year above the rates projected.

4.24 Interest Rates

Interest rates are also of critical importance in cash flow analysis. The basic rates of interest for the purpose of simulation are also those provided by the Ontario Economic Council and are as follows:

1976	8.6
1977	8.6
1978	7.7
1979	7.7
1980	7.7
1981	7.8
1982	7.9
1983	8.0
1984	8.1
1985	8.2
1986	8.4
1987	7.4

Source: J. Winder, D. Dungan, J. Sawyer. The Ontario Economy 1978-1987. Toronto, 1978, Ontario Economic Council, p. 38-39.

For the period after 1987 interest rates have been held constant. For the purposes of simulation the above rates have been increased or decreased by 1 percentage point per year.

4.25 Other Variables

Of the remaining variables included in the model, the most important are the initial stock estimates of contributors and beneficiaries. These estimates were provided by the actuarial report of 1975. For the purpose of the simulation it was necessary to convert the data relating to active teachers provided in the actuarial report to full time equivalents in accordance with the discussion provided earlier (Atherton, 1978, pp. 2-4).

Essentially the methodology involved taking the actual number of full-time teachers as reported by the Ministry of Education and expressing each age cohort as a percentage of the number of active teachers given in the actuarial report and scaling contributors accordingly.

Mortality rates are in accordance with tables provided by Statistics

Canada (Statistics Canada, 1975, pp. 70-75).

Disability rates, remarriage rates and other assumptions which it was decided would have minimal effect on the simulations were the same as those used in the Actuarial Report of 1975, Appendix B.

For the purpose of the cash flow analysis administration costs are projected to increase at the same rate as salaries in each of the three scenarios.

5.0 THE SIMULATIONS

5.1 INTRODUCTION

As indicated in Section 4.1 three simulations were run to reflect three alternative scenarios of the future from the standpoint of the behaviour of the fund. The following summarizes the assumptions for the future used for each scenario.

SCENARIO	VARIABLE	ASSUMPTION
Most Likely	Teacher Demand	Medium Projections, Column 2, Table 4. Using current sex and new hiring distribution.
	Retirement Rates	Current Actuarial Rates, Section 4.22.
	Salary Increase	As projected by Foot, Section 4.23.
	Interest Rates	As projected by Ontario Economic Council.
Optimistic	Teacher Demand	High Projected Demand, Column 3, Table 4. Using current sex and new hiring distribution
	Retirement Rates	Current Actuarial Rates, Section 4.22.
	Salary Increases	2 percent below those projected by Foot, Section 4.23.
	Interest Rates	1 percent above those projected by the Ontario Economic Council, Section 4.25.
Pessimistic	Teacher Demand	Low Projection. Column 1, Table 4. Using current new

	hiring ratio and elementary sex distribution.
Retirement Rates	Current Actuarial Rates (Section 4.22) for females. Increase in probability of male retirement in age group 55-59 by .05.
Salary Increases	2 percent annually above those projected by Foot, Section 4.23.
Interest Rates	1 percent lower annually than projected by Ontario Economic Council, Section 4.25.

Table 5 provides details of the data derived from the assumptions and projections at five year intervals from 1976-2000. The table shows that there is a considerable range between the optimistic and pessimistic estimates. It is hoped that by providing such a range it is possible to include most of the foreseeable contingencies which will influence the behaviour of the fund.

TABLE 5

COMPARISON OF ASSUMPTIONS USED IN EACH SCENARIO

SELECTED YEARS 1976-2000

VARIABLE	SCENARIO	YEAR 1976	1980	1985	1990	1995	2000
Demand	Optimistic	92738	87097	80177	79497	80281	81843
	Likely	92738	86824	79683	78457	79047	79157
	Pessimistic	92738	86351	79138	77707	77504	77300
Retirement Rates*	Optimistic	0.150	0.150	0.150	0.150	0.150	0.150
	Likely	0.150	0.150	0.150	0.150	0.150	0.150
	Pessimistic	0.150	0.200	0.200	0.200	0.200	0.200
Rate of Salary Increase	Optimistic	0.110	0.084	0.093	0.089	0.089	0.089
	Likely	0.110	0.064	0.073	0.069	0.069	0.069
	Pessimistic	0.110	0.044	0.053	0.049	0.049	0.049
Interest Rate	Optimistic	0.096	0.087	0.090	0.084	0.084	0.084
	Likely	0.096	0.077	0.080	0.074	0.074	0.074
	Pessimistic	0.096	0.067	0.070	0.064	0.064	0.064

*Retirement Rate is for males at age 55.

TABLE 5.21

DISTRIBUTION OF ACTIVE TEACHERS, PENSIONS IN PAY AND PENSIONER RATIOS

YEAR	DISTRIBUTION OF ACTIVE TEACHING POPULATION				DISTRIBUTION OF PENSIONS IN PAY				PENSIONER RATIOS	
	CONTINUING	REINSTATED	NEW HIRED	TOTAL	RETIREMENT	DISABILITY	SURVIVOR	TOTAL	RETIREMENT	OVERALL
1976	91188	310	1242	92740	15126	1392	1634	18152	0.163	0.196
1977	89342	460	1868	91670	16001	1399	1739	19139	0.175	0.209
1978	88184	360	1472	90016	16820	1427	1861	20108	0.187	0.223
1979	86609	375	1542	88526	17619	1456	1986	21061	0.199	0.238
1980	85220	320	1284	86824	18394	1490	2109	21993	0.212	0.253
1981	83605	335	1342	85282	19159	1523	2236	22918	0.225	0.269
1982	82163	270	1077	83510	19945	1553	2364	23862	0.239	0.286
1983	80501	220	902	81623	20735	1579	2502	24816	0.254	0.304
1984	78723	345	1379	80447	21543	1603	2656	25802	0.268	0.321
1985	77549	425	1707	79681	22355	1621	2812	26788	0.281	0.336
1986	76693	530	2135	79358	23195	1638	2967	27800	0.292	0.350
1987	76242	605	2437	79284	24082	1657	3126	28865	0.304	0.364
1988	76049	630	2542	79221	24995	1680	3300	29975	0.316	0.378
1989	75904	590	2377	78871	25927	1705	3487	31119	0.329	0.395
1990	75528	580	2349	78457	26873	1730	3683	32286	0.343	0.412
1991	75039	665	2702	78406	27880	1752	3893	33525	0.356	0.428
1992	74875	725	2937	78537	28922	1777	4118	34817	0.368	0.443
1993	74668	780	3165	78813	29992	1808	4347	36147	0.381	0.459
1994	75014	785	3207	79006	31081	1841	4579	37501	0.393	0.475
1995	75106	780	3160	79046	32190	1875	4817	38882	0.407	0.492
1996	75000	875	3565	79440	33394	1907	5064	40365	0.420	0.508
1997	75252	840	3400	79492	34637	1938	5314	41889	0.436	0.527
1998	75180	845	3430	79455	35928	1970	5573	43471	0.452	0.547
1999	75028	845	3416	79289	37292	2004	5832	45128	0.470	0.569
2000	74707	885	3565	79157	38753	2042	6103	46898	0.490	0.592
2001	74320	900	3656	78876	40412	2074	6374	48860	0.512	0.619

TABLE 5.22

DISTRIBUTION OF ACTIVE TEACHERS, PENSIONS IN PAY AND PENSIONER RATIOS

YEAR	DISTRIBUTION OF ACTIVE TEACHING POPULATION				DISTRIBUTION OF PENSIONS IN PAY				PENSIONER RATIOS	
	CONTINUING	REINSTATED	NEW HIRED	TOTAL	RETIREMENT	DISABILITY	SURVIVOR	TOTAL	RETIREMENT	OVERALL
1976	91188	310	1232	92730	15126	1392	1634	18152	0.163	0.196
1977	89328	480	1934	91742	16001	1399	1739	19139	0.174	0.209
1978	88234	445	1797	90476	16820	1427	1861	20108	0.186	0.222
1979	86993	465	1888	89346	17619	1456	1986	21061	0.197	0.236
1980	85921	230	940	87091	18394	1490	2109	21993	0.211	0.253
1981	83653	370	1478	85701	19159	1523	2236	22918	0.224	0.267
1982	82556	350	1415	84321	19945	1553	2364	23862	0.237	0.283
1983	81201	345	1393	82939	20735	1579	2502	24816	0.250	0.299
1984	79878	335	1345	81558	21543	1603	2656	25802	0.264	0.316
1985	78559	320	1288	80167	22355	1621	2812	26788	0.279	0.334
1986	77196	565	2269	80030	23195	1638	2967	27800	0.290	0.347
1987	76886	600	2411	79897	24062	1657	3127	28866	0.301	0.361
1988	76604	630	2527	79761	24995	1682	3301	29978	0.313	0.376
1989	76398	640	2583	79621	25927	1708	3486	31121	0.326	0.391
1990	76188	655	2647	79490	26873	1731	3683	32287	0.338	0.406
1991	75941	735	2965	79641	27880	1753	3892	33525	0.350	0.421
1992	75970	760	3067	79797	28922	1779	4117	34818	0.362	0.436
1993	75996	765	3173	79954	29992	1811	4345	36148	0.375	0.452
1994	76054	805	3252	80111	31081	1844	4574	37499	0.388	0.468
1995	76116	825	3327	80268	32190	1878	4814	38882	0.401	0.484
1996	76107	890	3584	80581	33394	1910	5062	40366	0.414	0.501
1997	76274	915	3700	80889	34637	1944	5314	41895	0.428	0.518
1998	76430	950	3827	81207	35930	1979	5573	43482	0.442	0.535
1999	76582	980	3949	81511	37298	2020	5830	45148	0.458	0.554
2000	76681	1025	4126	81832	38767	2062	6105	46934	0.474	0.574
2001	76711	980	3963	81654	40436	2097	6380	48913	0.495	0.599

TABLE 5.23

DISTRIBUTION OF ACTIVE TEACHERS, PENSIONS IN PAY AND PENSIONER RATIOS

YEAR	DISTRIBUTION OF ACTIVE TEACHING POPULATION				DISTRIBUTION OF PENSIONS IN PAY				PENSIONER RATIOS	
	CONTINUING	REINSTATED	NEW HIRED	TOTAL	RETIREMENT	DISABILITY	SURVIVOR	TOTAL	RETIREMENT	OVERALL
1976	91137	320	1284	92741	15177	1392	1634	18203	0.164	0.196
1977	89292	365	1484	91141	16098	1399	1739	19236	0.177	0.211
1978	87669	370	1505	89544	16963	1427	1861	20251	0.189	0.226
1979	86139	360	1447	87946	17803	1456	1987	21246	0.202	0.242
1980	84625	345	1379	86349	18615	1489	2110	22214	0.216	0.257
1981	83094	360	1449	84903	19421	1522	2236	23179	0.229	0.273
1982	81730	325	1309	83364	20244	1551	2366	24161	0.243	0.290
1983	80274	205	846	81325	21070	1576	2506	25152	0.259	0.309
1984	78384	310	1249	79943	21908	1600	2658	26166	0.274	0.327
1985	77051	410	1674	79135	22747	1618	2812	27177	0.287	0.343
1986	76144	540	2167	78851	23616	1635	2965	28218	0.300	0.358
1987	75711	565	2291	78567	24531	1654	3124	29309	0.312	0.373
1988	75336	580	2365	78281	25473	1675	3296	30444	0.325	0.389
1989	74965	595	2414	77994	26436	1700	3483	31619	0.339	0.405
1990	74648	605	2456	77709	27411	1723	3681	32815	0.353	0.422
1991	74247	680	2737	77664	28454	1745	3890	34089	0.366	0.439
1992	74090	700	2840	77630	29539	1770	4111	35420	0.381	0.456
1993	73942	720	2919	77581	30650	1801	4340	36791	0.395	0.474
1994	73801	745	2993	77541	31776	1834	4573	38183	0.410	0.492
1995	73675	760	3069	77504	32921	1865	4811	39597	0.425	0.511
1996	73482	785	3193	77460	34166	1893	5055	41114	0.441	0.531
1997	73325	810	3288	77423	35439	1923	5311	42673	0.458	0.551
1998	73162	835	3391	77388	36771	1952	5570	44293	0.475	0.572
1999	72966	865	3507	77338	38178	1985	5830	45993	0.496	0.595
2000	72737	900	3661	77298	39687	2022	6101	47810	0.513	0.619
2001	72438	935	3781	77154	41374	2051	6372	49797	0.536	0.645

5.2 CONTRIBUTION - PENSIONER RATIOS

Tables 5.21, 5.22, 5.23 provide estimates of the Contributor Pension Ratios under the most likely, the optimistic and the pessimistic scenario. For comparative purposes these ratios have been displayed below in Table 5.24

TABLE 5.24

RATIOS BETWEEN PENSIONERS OF ALL TYPES AND CONTRIBUTORS

YEAR	MOST LIKELY	OPTIMISTIC	PESSIMISTIC
1976	0.196	0.196	0.196
1977	0.209	0.209	0.211
1978	0.223	0.222	0.226
1979	0.238	0.236	0.242
1980	0.253	0.253	0.257
1981	0.269	0.267	0.273
1982	0.286	0.283	0.290
1983	0.304	0.299	0.309
1984	0.321	0.316	0.327
1985	0.336	0.334	0.343
1986	0.350	0.347	0.358
1987	0.364	0.361	0.373
1988	0.378	0.376	0.389
1989	0.395	0.391	0.405
1990	0.412	0.406	0.422
1991	0.428	0.421	0.439
1992	0.443	0.436	0.456
1993	0.459	0.452	0.474
1994	0.475	0.468	0.492
1995	0.492	0.484	0.511
1996	0.508	0.501	0.531
1997	0.527	0.518	0.551
1998	0.547	0.535	0.572
1999	0.569	0.554	0.595
2000	0.592	0.574	0.619
2001	0.619	0.599	0.645

The simulations suggest a dramatic increase in the ratio of pensioners to contributors regardless of the scenario used. Even so it is worth noting that the difference between the optimistic and pessimistic ratio is in the order of 5 percent by the year 2000.

It may be suggested that variations in teacher demand data would need to be very substantial before any significant change in the ratios would result. Furthermore, changes in the distribution of hiring between new and reinstated teachers would have little effect on the overall ratios produced.

Upon first inspection these ratios would suggest that a teaching force which is barely twice the size of the number of retirees would create a tremendous problem for the fund. For this reason the projections of cash flow are considered extremely important.

5.3 CASH FLOW ANALYSES

5.31 Most Likely Scenario

Table 5.31 provides details of the cash flow projections under the most likely scenario.

The following observations are worth noting.

a) Insofar as the net cash flow to the fund itself is concerned, it is projected to increase continuously throughout the period.
b) Teachers' contributions and reinstatements alone will be inadequate to match pensions and withdrawals after 1980.
c) Matching contributions by active teachers and the provincial government as employer at the current rate will exceed outflows for benefits and administration until the year 1994.
d) After 1994 the maintenance of pension benefits will depend increasingly on interest payments received from the provincial government. By 2000 matching contributions and reinstatements will account for close to 77 percent of total outflows.
e) Special payments which include the amortization of unfunded liabilities do not influence the overall position of the cash flow to any significant extent throughout the period projected.

TABLE 5.31

ANNUAL REVENUES, EXPENDITURES AND NET CASH FLOW - 1976 - 2000
($000 OMITTED)

	REVENUE SOURCES						EXPENDITURES					
	CONTRIBUTIONS TEACHER	CONTRIBUTIONS GOV.T	REINSTATED PAYMENTS	INTEREST ON FUND	SPECIAL PAYMNTS	TOTAL INFLOW	BENEFIT PAYMENTS RETIREMENT	BENEFIT PAYMENTS OTHER	WITHDRAWN CONTRIB.N	ADMIN. EXPENSES	TOTAL OUTFLOW	NET CASH FLOW
1976	103689	83442	1176	131993	46753	369053	91497	10156	8394	1642	111689	257364
1977	114269	111911	1919	156126	65958	450183	101151	10610	9133	1808	122702	327481
1978	123189	123431	1652	184289	64999	497560	111525	11236	10126	1967	134854	362706
1979	130825	133170	1891	212218	64078	542182	122962	11937	10786	2125	147810	394372
1980	137595	141352	1760	242584	63194	586493	135164	12767	11207	2284	161422	425071
1981	143763	148605	2016	275315	62346	632045	149246	13655	11197	2453	176551	455494
1982	150601	155213	1760	310388	61532	679494	165338	14593	11089	2644	193664	485830
1983	159313	162549	1545	348282	60750	732439	183311	15625	10902	2865	212703	519736
1984	169147	171929	2596	389342	59999	793013	203247	16736	10582	3113	233678	559335
1985	180310	182538	3412	434088	59278	859676	225039	17916	10582	3386	256923	602753
1986	193162	194654	4536	482911	58586	933849	249955	19204	10918	3698	283775	650074
1987	206595	208504	5524	536217	57922	1014762	277823	20652	11466	4040	313981	700781
1988	220947	223055	6133	595083	57285	1102503	308817	22345	12194	4416	347772	754731
1989	235655	238641	6128	658933	56673	1188030	343096	24273	12968	4824	385161	802869
1990	251099	254395	6431	710345	34171	1256441	380892	26556	13576	5268	426292	830149
1991	267800	270943	7800	771777	33607	1352007	422509	29100	14144	5755	471508	880499
1992	286034	288850	9195	836933	33066	1454078	469052	31994	15079	6296	522421	931657
1993	305575	308409	10600	905076	32546	1563006	520898	35370	16361	6894	579523	983483
1994	326295	329375	11408	978654	32047	1677779	578250	39158	17826	7549	642783	1034996
1995	347591	351610	12125	1055243	31568	1798137	641560	43276	19331	8259	712426	1085711
1996	370592	374464	14534	1135586	31108	1926284	713627	47648	20749	9054	791078	1135206
1997	394702	399152	14912	1219591	30667	2059024	793504	52587	22609	9926	878626	1180398
1998	419596	425031	16047	1306941	30243	2197861	882600	58084	24540	10882	976106	1221755
1999	445296	451758	17152	1397351	29836	2341393	983383	63996	26241	11941	1085561	1255832
2000	472609	479349	19209	1490282	29445	2490894	1098202	70544	28127	13130	1210003	1280891
2001	498231	508676	20885	1585060	29070	2641930	1230983	77335	30250	14452	1353028	1288902

f) Teacher contributions to the fund will increase through the period in spite of the decreasing size of the teaching force. (See Table 4.)

g) In spite of the continued growth of the fund, some concern must be expressed about the relative rates of growth of both inflows and outflows. In the four year period between 1981-1985, inflows increase by 36 percent, an annual rate of 9 percent; outflows increase by 46 percent or an annual rate of 11.5 percent. Between 1996 and 2000 inflows are projected to increase 29 percent, an annual rate of just over 7 percent; outflows are projected to increase by 53 percent or just over 15 percent per year.

5.32 Optimistic Scenario

The optimistic scenario is based on a high demand for teachers, low rates of salary increases, high rates of interest and current retirement rates.

Table 5.32 provides details of the cash flow projections under assumptions most optimistic to the operation of the fund.

The following observations are worth noting.

a) The net cash flow to the fund is projected to increase continuously throughout the period of the projection.

b) Teacher contributions and reinstatements alone will be inadequate to provide for pensions and withdrawals after 1978.

c) Matching contributions by active teachers and the provincial government as employer at the current rates will be adequate to maintain pension levels, withdrawals and administrative expenses until the turn of the century. By 2001, it is projected that matching contributions from teachers and employers together with reinstatements will account for some 97 percent of total pensions and administrative costs.

d) After the year 2000 the maintenance of pension benefits will depend increasingly on interest payments by the government.

e) Special payments which include amortization on unfunded liability will not influence the overall position of the cash flow picture to any significant extent.

f) Teacher contributions to the fund will increase throughout the period in spite of the decreasing size of the teaching force.

TABLE 5.32

ANNUAL REVENUES, EXPENDITURES AND NET CASH FLOW - 1976 - 2000
($000 OMITTED)

	REVENUE SOURCES						EXPENDITURES					
	CONTRIBUTIONS TEACHER	CONTRIBUTIONS GOV.T	REINSTATED PAYMENTS	INTEREST ON FUND	SPECIAL PAYMNTS	TOTAL INFLOW	BENEFIT PAYMENTS RETIREMENT	BENEFIT PAYMENTS OTHER	WITHDRAWN CONTRIB.N	ADMIN. EXPENSES	TOTAL OUTFLOW	NET CASH FLOW
1976	103683	83442	1176	133993	46753	369047	91497	10156	8394	1642	111689	257358
1977	116708	111905	2011	158699	65958	455281	101151	10610	9147	1627	122735	332546
1978	128759	126220	2064	188628	64999	510670	111562	11239	10235	2012	135048	375622
1979	139722	139413	2377	221307	64078	566897	123127	11950	11129	2198	148404	418493
1980	149972	151367	1300	257716	63194	623549	135605	12796	11853	2386	162640	460909
1981	160150	162546	2302	297815	62346	685159	150195	13709	11844	2592	178340	506819
1982	171763	173643	2389	341908	61532	751235	167141	14691	11893	2828	196553	554682
1983	186381	186294	2582	390720	60750	826727	186433	15795	12188	3108	217524	609203
1984	202234	202225	2735	444330	59999	911523	208291	17005	12301	3420	241017	670506
1985	219293	219496	2844	504005	59278	1004916	232718	18314	12455	3762	267249	737667
1986	239664	238103	5457	570395	58586	1112205	261206	19763	12654	4165	297788	814417
1987	261829	260334	6303	644507	57922	1230895	293778	21441	13604	4616	333439	897456
1988	285658	284547	7196	727073	57285	1361759	330754	23467	14963	5119	374303	987456
1989	311379	310605	7954	819894	56673	1506505	372499	25799	16150	5677	420125	1086380
1990	339432	338792	8860	911150	34171	1632405	419474	28538	17429	6299	471740	1160665
1991	370077	369172	10823	1008646	33607	1792325	472450	31702	18825	6993	529970	1262355
1992	403760	402367	12206	1114484	33066	1966083	532854	35386	20622	7776	596638	1369445
1993	439953	438860	13752	1229717	32546	2154828	601421	39759	22745	8649	672574	1482254
1994	479242	478075	15363	1356226	32047	2358973	678744	44691	25027	9621	758083	1600890
1995	521258	520648	17176	1488701	31568	2579351	765750	50177	27552	10697	854176	1725175
1996	567177	566178	20194	1633616	31108	2818273	866733	56105	30326	11920	965084	1853189
1997	617005	615942	22628	1789284	30667	3075526	980803	63085	33636	13287	1090811	1984715
1998	670999	669946	25610	1956000	30243	3352798	1110591	70904	37432	14819	1233746	2119052
1999	729117	728468	28779	2134000	29836	3650200	1260185	79677	41500	16551	1397913	2252287
2000	792410	791461	32809	2323192	29445	3969317	1433969	89467	45977	18526	1587939	2381378
2001	853955	860067	34166	2521228	29070	4300486	1638756	99779	51036	20739	1810310	2490176

5.33 Pessimistic Scenario

The pessimistic scenario is based on a low demand for teachers, higher probabilities of retirement, high rates of salary increase and low rates of interest.

Table 5.33 provides details of the cash flow projections under the assumptions most pessimistic to the operation of the fund.

The following observations are worth noting.

a) The net cash flow to the fund is projected to increase continuously throughout the period of the projection.
b) Teachers' contributions and reinstatement payments alone are currently inadequate to match pension payments and withdrawals.
c) Matching contributions by teachers and the provincial government as employer will exceed outflows for total benefits and administration until 1988.
d) After 1988 the maintenance of pension benefits will depend increasingly on interest payments received from the provincial government. By 2000 the total of matching contributions and reinstatements will account for 54 percent of outflows.
e) Special payments which include the amortization of unfunded liabilities do not influence the overall position of the cash flow picture to any significant extent.
f) Teacher contributions to the fund will increase through the period in spite of the decreasing size of the teaching force.
g) Between 1938 and 1988 inflows (including interest) to the fund are projected to increase by a total of 35 percent or an annual 7 percent; outflows are projected to increase by 56 percent or just over 11 percent per year. Between 1995 and 2001 total inflows are projected to increase by 22 percent of by just over 4 percent per annum; outflows are projected to increase by 56 percent or by just more than 11 percent.

5.4 GENERAL DISCUSSION

All three scenarios suggest that the Teachers' Superannuation Plan is sound insofar as current operations are concerned provided that the provincial

TABLE 5.33

ANNUAL REVENUES, EXPENDITURES AND NET CASH FLOW - 1976 - 2000
($000 OMITTED)

	REVENUE SOURCES						EXPENDITURES					
	CONTRIBUTIONS TEACHER	CONTRIBUTIONS GOV.T	REINSTATED PAYMENTS	INTEREST ON FUND	SPECIAL PAYMNTS	TOTAL INFLOW	BENEFIT PAYMENTS RETIREMENT	BENEFIT PAYMENTS OTHER	WITHDRAWN CONTRIB.N	ADMIN. EXPENSES	TOTAL OUTFLOW	NET CASH FLOW
1976	103716	83442	1216	133993	46753	369120	92078	10156	8392	1647	112273	256847
1977	111560	111940	1514	151513	65958	444485	102310	10610	9141	1795	123856	320629
1978	117515	120358	1682	175957	64999	480511	113283	11233	9979	1936	136431	344080
1979	121945	126635	1791	199010	64078	513459	125219	11927	10513	2072	149731	363728
1980	125158	131238	1867	223380	63194	545037	137769	12724	10849	2206	163548	381489
1981	128493	134770	2101	248940	62346	576650	152092	13582	10694	2353	178721	397929
1982	131567	138022	2024	275601	61532	608746	168095	14458	10462	2512	195527	413219
1983	136067	141225	1354	303700	60750	643096	185588	15412	10171	2696	213867	429229
1984	140922	145982	2149	332088	59999	681940	204416	16429	9657	2894	233396	448544
1985	146845	151127	2976	361837	59278	724063	224471	17478	9348	3110	254407	469656
1986	153644	157434	4097	396713	58586	770474	246940	18603	9450	3353	278346	492128
1987	160367	164696	4484	431654	57922	819123	271460	19853	9777	3613	304703	514420
1988	167374	171890	4810	468692	57285	870051	298148	21233	10145	3894	333420	536631
1989	174216	179402	5160	508403	56673	923854	327054	22837	10471	4192	364554	559300
1990	181338	186764	5494	544198	34171	951965	358166	24653	10816	4513	398148	553817
1991	189012	194292	6469	579643	33607	1003023	391768	26682	11185	4859	434494	568529
1992	196856	202419	6985	616028	33066	1055354	428723	28934	11721	5236	474614	580740
1993	204703	210731	7545	653196	32546	1108921	468976	31539	12377	5643	518535	590386
1994	212989	219262	8188	690980	32047	1163466	512430	34408	13053	6078	565969	597497
1995	221166	227838	8753	729220	31568	1218545	559406	37386	13778	6543	617111	601434
1996	229342	236513	9477	767712	31108	1274152	611905	40428	14554	7053	673940	600212
1997	237914	245189	10251	806126	30667	1330147	668554	43928	15406	7603	735491	594656
1998	246355	254291	11075	844184	30243	1386148	730808	47665	16355	8198	803026	583122
1999	254954	263296	12018	881503	29836	1441567	799904	51699	17352	8852	877807	563760
2000	263899	272392	13108	917584	29445	1496428	877325	56081	18422	9578	961406	535022
2001	271164	281900	14273	951825	29070	1548232	964030	60447	19590	10365	1054432	493800

government maintains interest payments on contributions. Even then it is suggested that the use of interest payments for the purpose of meeting current obligations will not prove necessary until sometime between 1988 and 2000 with the most likely estimate falling in 1991.

Furthermore the most likely scenario suggests that if the government as employer maintains its matching contribution throughout the period the amounts of money required to balance the outflows are less than the projected interest payments as the following would suggest.

YEAR	TOTAL INFLOWS LESS SCHEDULED INTEREST AND SPECIAL PAYMENTS	OUTFLOWS (PENSIONS, WITHDRAWALS & ADMIN.)	PROJECTED DEFICIT	SCHEDULED INTEREST PAYMENTS
		(000,000's)		
1985	366.3	256.9	0	482.9
1991	546.6	471.5	0	771.7
1995	707.1	712.4	5.3	1055.2
2000	971.1	1210.0	238.9	1490.2

A similar analysis using the optimistic and pessimistic scenarios would of course change the specific picture for each year. Under the pessimistic scenario for instance the difference between contributions and outflows is 497.1 million for 2001. Interest payments for the same year are projected to be 951.8 million. The optimistic scenario would reduce the deficit and therefore further increase the difference between the actual amount required to be paid out of government funds to meet benefits and interest payments. As a consequence the general observation that interest payments exceed any deficits arising out of the current level of contributions and benefits is warranted.

Whilst the magnitude of the sums required of the government for interest payment is not inconsiderable, it is fair to note that they are no greater than would be required if the government were to go to the market for the capital which it derives from contributions to the fund.

In Working Paper Number 1, Foot (p. 30) notes that the provincial govern-

ment has been able to meet part of its cash requirements by borrowing from the major public pension plans (including the Teachers' Superannuation Plan). He notes that this source of funds will turn negative in the mid 1980's. Insofar as the Teachers' Superannuation Fund is concerned, the projections suggest that the negative flow will be delayed. While the pessimistic scenario suggests that this will occur by 1988, the most optimistic scenario suggests a delay until the turn of the century. The most likely scenario provides that 1994 will be the turning point.

A second general observation relates to the role of special payments by the provincial government. These special payments include payments required to amortize unfunded liability. Actuarial reports tend to emphasize the problem of unfunded liability with the result that a great deal of attention is drawn to its magnitude.

When special payments are included in the current operational analysis their significance diminishes appreciably. In all three scenarios the picture and soundness of the plan would not be appreciably altered if such payments were excluded from the calculation.

At this point it should be pointed out that the projections for special payments differ significantly from that provided in the Auditors Report for 1975. The auditors note that the annual payments of almost 150 million dollars are required to amortize the unfunded liability, whereas the projections provide for annual payments of less than one third of this amount.

In explaining the difference it should be noted that the actuarial report of total unfunded liability reflects December, 1975 estimates of the excess of the present value of future benefits over the sum of assets and present value of future contributions. The schedule of payments is based on amortization of this amount over a period of 15 years or until 1989. There is thus a compression of the total liability. In the projections there is no attempt to estimate present value, therefore the question of unfunded liability does not arise.

It must be emphasized that for the projections, actual (assumed) annual payments by teachers and their employers together with interest on these contributions and the fund itself are the most significant components of inflows.

Furthermore any additional inflows in the form of amortization payments as scheduled in the actuarial report would only serve to improve the cash flow of the fund. They are not required to balance it from the cash flow position.

It is possible that the projections have not been carried as far as they could in spite of the obvious limitations of the data. The rapid growth in rates of increase in outflows projected for the period 1996-2001 compared with the 1981-1985 period, and much lower rates of increase in inflows for the same periods suggest that, if continued, a deficit position must be reached. The substantial reduction in the net cash flow under the pessimistic scenario compared with that of the most likely scenario adds to the concern. The net cash flow under the most likely scenario is projected at $1,288.9 million in 2001 but $493.8 million for the same year under the pessimistic scenario.

It might be interesting to attempt to put the cash flow analysis into the perspective of the overall financing of education and to relate the total government payment required to maintain the flow of present benefits to the total cost of education. For this purpose one might choose the pessimistic scenario on the grounds that it represents the most disadvantageous position for the government.

For this exercise it will be assumed that teacher contributions represent 6 percent of the total salary bill. In 2001 with projected contributions of 271.2 million, the total salary bill will be in the order of 4519.4 million. If it is further assumed that salaries will account for 70 percent of total current expenditure, then the cost of education will amount to some 6456.3 million. If the government were to meet the total bill for outflows of 1054.4 million less the teachers' contributions of 271.1 million, it would be required to pay out 783.3 million or 12 percent of the total bill. This figure would include the matching contribution and thus reflect only a 6 percent additional contribution. Under the most likely and optimistic scenarios the total government contribution as a proportion of total educational cost would be lower.

6.0 POLICY IMPLICATIONS

It was suggested in the earlier parts of this paper that the provisions for superannuation were, together with those for civil servants, more generous than those available to other employees in the public sector. It was also suggested that any improvement in benefits could only be justified if the

financial position of the fund so warranted.

Although it was anticipated that the projections of the operation of the fund would suggest that it would be in a precarious position by the end of the century, this has not proved to be the case. Even the pessimistic scenario has suggested that provided the government meets its obligations with respect to matching contributions and interest payments, the annual inflows to the fund will be more than adequate to match the outflows under present benefit conditions.

Furthermore the projections suggest that the present level of contributions is, from the cash flow viewpoint, adequate to maintain present benefits during the period of the projection. The projections therefore are at variance with the actuarial recommendations discussed in Section 3.4 (p. 24).

It is conceivable therefore that some improvement in benefits could be provided to mitigate the effects of the worst years of the decline in teacher demand anticipated to occur over the next decade. This suggestion is subject to two reservations. First there can be no doubt that any extension of benefits in the context of the present governmentally administered plan would lead to repercussions among the public as a whole.

Such repercussions would possibly be fewer if the plan were to be administered in a manner similar to that of OMERS or HOOPP. Such an administrative change would have the effect of making the operations of the Teachers' Retirement Fund similar to that of a private pension plan. Adjustments in contributions and benefits under such a system of administration would then be wholly dependent upon the financial health of the fund and not be perceived as an aspect of public policy.

The second reservation concerns the operation of the fund in the first and second decades of the next century. The rapid increase in the rates of outflows compared to inflows which accelerate at the end of the projection period as a consequence of the eligibility for retirement of the substantial number of teachers who entered the teaching force in the 1960's would accelerate more rapidly if benefits were improved during the 1980's. Although no projections are available, it is suggested that the period of possible deficit would be brought forward into the last decade of this century. If the fund were to be

administered in a manner similar to OMERS or HOOPP this problem would become part of the collective bargaining structure and subject to applications of the Pension Benefits Act insofar as employer contributions are concerned. It would be assumed that the role of the provincial government in such a system would be indirect only.

A change in administrative structure would introduce other considerations however. First there would be an implication that the investment portfolio for the fund would be at least partially diversified (OMERS) and thus deprive the provincial government of access to funds required to meet its own cash needs. Perhaps of more significance is that a change in structure would in all likelihood require the government to meet the total of amortization payments calculated by the actuaries as they become due. It has been projected that such payments are unnecessary to maintain the fund from an operating viewpoint during the amortization period currently required.

Furthermore a change in structure would imply that all matching contributions, and interest would be payable by the government to the fund annually. Again the projections indicate that only partial payments of interest are required to meet obligations until after the end of the century.

In effect the change in administrative structure would result in the Teachers' Superannuation Fund becoming a wholly funded plan. The costs of providing such a plan would be most onerous during the next ten or twenty years.

An alternative approach would be for the government to cease operation of the fund as a separate entity. At this point it is worth noting the comments made in Working Paper Number 7 (Atherton, 1978). It was noted that only in Canada, the United State and Great Britain are special plans for retiring teachers available (p. 20) and that even in Canada only British Columbia, Manitoba, Nova Scotia and Ontario have established trust funds for both teachers' and governments' contributions (p. 23).

If only the teachers' contribution were held in a separate fund as in Alberta, Saskatchewan and Prince Edward Island, the total demand from provincial revenue would equal that of the employers' contribution until the late 1980's and thereafter increase at an amount less than that of required interest and amortization payments.

If, as in Quebec, Newfoundland and New Brunswick, no fund was provided and all pension payments met out of consolidated revenue, demands on current revenue would be further reduced by the amount of employers' contributions until such time as pensions payable exceed employees' contributions. It must be noted, however, that the provincial government in the provinces with this system is responsible for negotiating with teachers for both salaries and benefits. It is assumed, therefore, that the government negotiating position will be based on estimates of future requirements insofar as new benefits are conceived.

In essence this working paper has drawn attention to the following points.

1) Retirement benefits for teachers compare favourably with the benefits currently provided by other Public Sector Pension Plans.
2) Although projections of cash flow suggest that for the remainder of the century no excessive demands will be made on government revenues, a much higher degree of uncertainty exists for the first decade or two of the next centurey.
3) An increase in overall benefits could radically alter the picture although there is some apparent leeway for improving benefits to cover the worst period of enrolment decline.
4) Changes in the structure of administration of the plan could provide the government with either
   a) an increased demand for funding over the next twenty years with a consequent reduction in demand thereafter.
   b) a reduced demand for funding for the next twenty years and an increase in demand thereafter.
5) If structural change to provide for (b) is made, there is an implication that a much higher degree of involvement of government in setting salaries and benefits will be required.

APPENDIX A

TABLE A1

DETAILS OF PUBLIC SERVICE SUPERANNUATION FUND 1965 - 1976 ($ thousands)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Gross Payroll of Members[1]	$224,108	$276,795	$310,386	$344,726	$398,831	$441,216	$514,523	$585,775	$659,451	$699,556	$855,215	$992,775
Total Contributions to Fund	26,235	30,554	28,323	33,470	39,916	44,240	51,611	48,714	66,954	73,934	86,878	101,675
Total Contributions and Special Payments to Funds[2]	---	34,685	32,454	37,601	44,047	48,371	66,151	73,254	81,861	88,177	101,121	131,383
Gross Inflow to Funds	35,813	44,772	44,897	51,741	59,963	66,091	86,363	101,681	118,515	128,957	151,291	194,615
Benefit Payments of Fund	8,002	9,168	10,342	11,584	12,993	15,058	17,583	20,048	23,130	27,137	30,841	35,026
Benefit Payments and Refunds	11,142	13,374	14,214	15,384	17,341	20,695	22,422	25,610	30,186	35,577	40,997	44,187
Total Contributions as Per Cent of Gross Payroll	11.7	11.0	9.1	9.7	10.0	10.0	10.0	10.0	10.2	10.6	10.2	10.2
Total Contributions and Special Payment as Per Cent of Gross Payroll	---	12.5	10.5	10.9	11.0	11.0	12.9	12.5	12.4	12.6	11.8	13.2
Benefit Payments as a Per Cent of Gross Payroll	3.6	3.3	3.3	3.4	3.3	3.4	3.4	3.4	3.5	3.9	3.6	3.5
Benefit Payments as a Per Cent of Total Contributions	30.5	30.0	36.5	34.6	32.6	34.0	34.1	34.2	34.6	36.7	35.5	34.4
Benefit Payments and Refunds as a Per Cent of Total Contributions	42.5	43.8	50.2	46.0	43.4	46.8	43.4	43.6	45.1	48.1	47.2	43.5
Benefit Payments and Refunds as a Per Cent of Gross Inflows	31.1	29.9	31.7	29.7	28.9	31.3	26.0	25.2	25.5	27.6	27.1	22.7

1. Estimated
2. Actuarially Recommended Special Payments

Sources: Public Accounts
Ontario Treasury

TABLE A2

DETAILS OF ONTARIO MUNICIPAL EMPLOYEES RETIREMENT SYSTEM 1965 - 1976 ($ thousands)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Gross Payroll of Members[1]	$121,824	$216,864	$270,802	$324,803	$405,350	$492,513	$585,795	$687,414	$812,593	$926,275	$ --	$
Total Contributions to Fund	13,990	20,109	23,821	29,331	40,694	46,734	57,795	70,025	84,676	99,774	129,187	161,
Total Contributions and Special Payment to Fund[2]	--	--	--	--	--	--	--	--	--	--	--	--
Gross Inflow to Fund	15,078	22,017	26,848	34,000	47,916	57,854	74,400	95,728	128,960	149,439	195,443	250,
Benefit Payments of Fund	76	225	381	546	802	1,276	2,117	3,195	4,612	6,644	8,983	12,
Benefit Payments and Refunds	724	1,140	1,565	2,047	3,048	4,048	4,950	7,035	9,733	14,011	15,693	21,
Total Contributions as Per Cent of Gross Payroll	11.5	9.3	8.8	9.0	10.0	9.5	9.9	10.2	10.4	10.8	--	
Total Contributions and Special Payments as Per Cent of Gross Payroll	--	--	--	--	--	--	--	--	--	--	--	
Benefit Payments as Per Cent of Gross Payroll	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	--	
Benefit Payments as Per Cent of Total Contributions	0.5	1.1	1.6	1.9	2.0	2.7	3.7	4.6	5.4	6.7	7.0	8.
Benefit Payments and Refunds as Per Cent of Total Contributions	5.2	5.7	6.6	7.0	7.5	8.7	8.6	10.1	11.5	14.0	12.2	13
Benefit Payments and Refunds as Per Cent of Gross Inflows*	4.8	5.2	5.8	6.0	6.4	7.0	6.7	7.3	7.5	9.4	8.0	8.

1. Estimated
2. Actuarially Recommended Special Payments

Sources: Annual Reports of OMERS

* Gross inflow includes the administered funds whereas benefits do not.

TABLE A3

DETAILS OF HOSPITAL OF ONTARIO PENSION PLAN 1965 - 1975 ($ thousands)

	1965	1966	1967	1968	1969	1970[3]	1971	1972	1973	1974	1975
Gross Payroll of Members[1]	$83,092	$83,589	$96,983	$102,694	$175,707	$193,207	$199,584	$241,747	$360,650	$426,454	$578,000
Total Contributions to Fund	10,573	10,963	11,321	13,880	16,997	22,054	28,168	33,801	38,205	52,675	69,580
Total Contributions and Special Payments to Funds[2]	--	--	--	--	--	--	--	--	--	--	--
Gross Inflow to Fund	12,768	13,778	14,827	17,841	22,095	25,608	36,545	42,760	52,213	65,214	84,037
Benefit Payments of Fund	592	804	1,034	1,271	1,593	2,130	2,687	3,330	4,099	5,010	6,158
Benefit Payments and Refunds	1,737	2,212	2,450	2,765	3,218	4,351	5,607	6,544	8,352	9,785	13,444
Total Contributions as Per Cent of Gross Payroll	12.7	13.1	11.7	13.5	9.8	11.4	14.1	14.0	10.6	12.4	12.0
Total Contributions and Special Payments as Per Cent of Gross Payroll	--	--	--	--	--	--	--	--	--	--	--
Benefit Payments as Per Cent of Gross Payroll	0.7	1.0	1.1	1.2	0.9	1.1	1.3	1.4	1.1	1.2	1.1
Benefit Payments as Per Cent of Total Contributions	5.6	7.3	9.1	9.2	9.4	9.7	9.5	9.9	10.7	9.5	8.9
Benefit Payments and Refunds as Per Cent of Total Contributions	16.4	20.2	21.6	19.9	18.9	19.7	19.9	19.4	21.9	18.6	19.3
Benefit Payments and Refunds as Per Cent of Gross Inflows	13.6	16.1	16.5	15.5	14.6	17.0	15.3	15.3	16.0	15.0	16.0

1. Estimated by Hospitals of Ontario Pension Plan
2. Actuarially Recommended Special Payments
3. Year-end changed from June 30 to December 31

Sources: Report of Pension Committee, Ontario Hospital Association

TABLE A4

DETAILS OF HYDRO PENSION PLAN 1965 - 1976 ($ thousands)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Gross Payroll of Members[1]	$80,900	$88,885	$100,123	$113,481	$135,481	$158,462	$179,423	$197,181	$230,365	$261,600	$ --	$ --
Total Contributions to Fund	8,092	15,087	16,786	20,672	23,838	26,023	30,137	33,29[illegible]	39,918	49,082	59,704	68,594
Total Contributions and Special Payments to Fund	--	--	--	--	--	--	--	--	--	--	--	--
Gross Inflow to Fund	17,049	24,883	28,899	33,418	38,731	39,961	47,836	53,489	64,985	79,696	93,675	107,445
Benefit Payments of Fund	3,592	3,880	4,441	5,286	5,717	6,237	7,742	8,645	9,723	11,735	14,133	16,961
Benefit Payments and Refunds	4,252	4,781	5,068	5,830	6,301	6,800	8,171	9,344	10,671	12,855	15,124	17,118
Total Contributions as Per Cent of Gross Payroll	10.0	17.0	16.8	18.2	17.6	16.4	16.8	16.9	17.3	18.8	--	--
Total Contributions and Special Payments as Per Cent of Gross Payroll	--	--	--	--	--	--	--	--	--	--	--	--
Benefit Payments as Per Cent of Gross Payroll	4.4	4.4	4.4	4.7	4.2	3.9	4.3	4.4	4.2	4.5	--	--
Benefit Payments as Per Cent of Total Contributions	44.4	25.7	26.5	25.6	24.0	24.0	25.7	26.0	24.4	23.9	23.7	24.7
Benefit Payments and Refunds as Per Cent of Total Contributions	52.5	31.7	30.2	28.2	26.4	26.1	27.1	28.1	26.7	26.2	25.3	25.0
Benefit Payments and Refunds as Per Cent of Gross Inflows	24.9	19.2	17.5	17.4	16.3	17.0	17.1	17.5	16.4	16.1	16.1	15.9

1. Estimated amounts except for the years 1967, 1970, 1973

Sources: Report on Pension Fund
Ontario Hydro Pension Plan Actuarial Report

TABLE A5

DETAILS OF TEACHERS' SUPERANNUATION FUND 1965 - 1975 ($ thousands)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Gross Payroll of Members[1]	$363,665	$410,304	$473,941	$572,684	$529,963	$753,118	$862,872	$936,630	$1,007,308	$1,076,761	$1,566,415
Total Contributions to Fund[2]	44,561	50,656	58,792	71,641	113,451	91,160	102,158	113,426	120,946	129,000	162,469
Total Contributions and Special Payments to Fund	47,049	68,363	85,372	90,967	133,638	110,359	127,077	142,144	142,587	222,652	268,322
Gross Inflow to Fund	63,544	87,484	106,523	116,535	164,930	142,663	171,196	206,960	216,541	310,529	400,948
Benefit Payments of Fund	15,787	18,733	22,091	25,281	28,859	35,259	43,937	51,413	62,763	75,146	102,078
Benefit Payments and Refunds	20,386	23,681	26,517	30,741	35,259	42,442	52,547	60,020	72,425	86,253	114,202
Total Contributions as Per Cent of Gross Payroll	12.3	12.4	12.4	12.5	21.4	12.1	11.8	12.1	12.0	12.0	10.4
Total Contributions and Special Payments as Per Cent of Gross Payroll	12.9	16.7	18.1	15.9	25.2	14.7	14.7	15.2	14.2	20.8	17.1
Benefit Payments as Per Cent of Gross Payroll	4.3	4.6	4.7	4.4	5.4	4.7	5.1	5.5	6.2	7.0	6.5
Benefit Payments as Per Cent of Total Contributions	35.2	36.9	37.5	35.2	25.4	38.6	42.9	45.2	51.7	58.1	62.8
Benefit Payments and Refunds as Per Cent of Total Contributions	45.7	46.7	45.1	42.9	31.1	46.6	51.4	52.9	59.9	66.9	70.3
Benefit Payments and Refunds as Per Cent of Gross Inflows	32.1	27.1	24.9	26.4	21.4	29.8	30.7	29.0	34.4	27.8	28.5

1. Estimated by Teachers' Superannuation Commission
2. Includes only employer and employee contributions

Sources: Annual Reports of Teachers' Superannuation Commission to Legislature